CPC Subseasonal Outlooks and associated NMME needs/requirements

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NMME Subseasonal Forecast System Exploratory Workshop
March 30-31, 2015
College Park, MD

Outline

- CPC Subseasonal Official Outlook Product Suite
- Planned Experimental Subseasonal Outlook Products
- NMME needs / requirements

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- **CPC Subseasonal Official Outlook Product Suite**
- Planned Experimental Subseasonal Outlook Products
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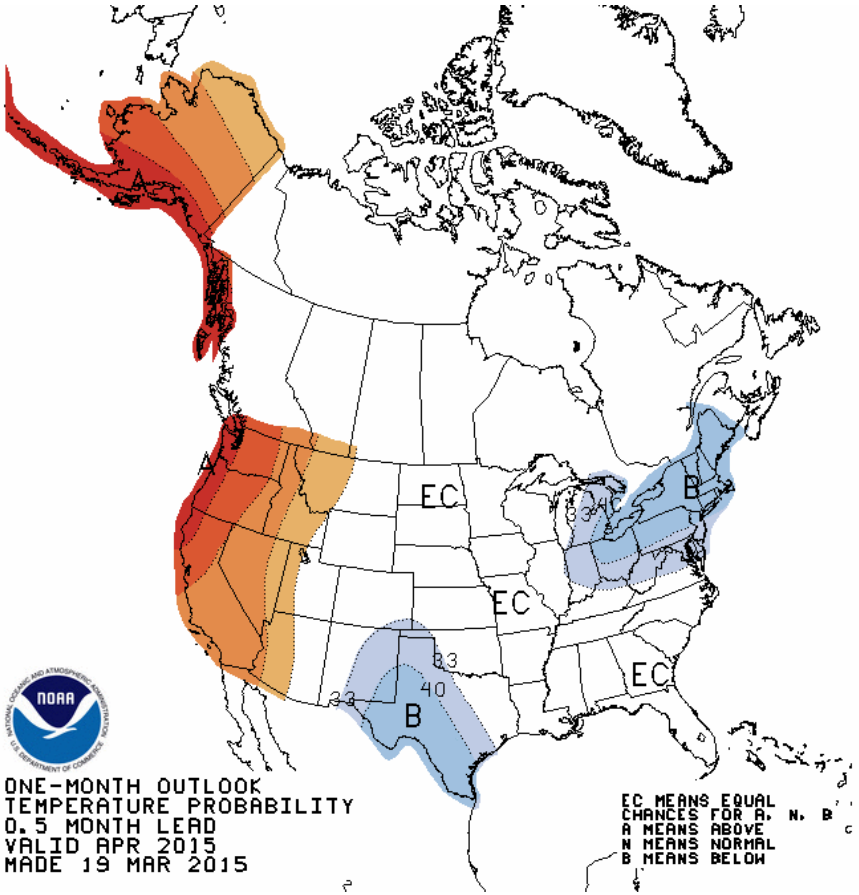
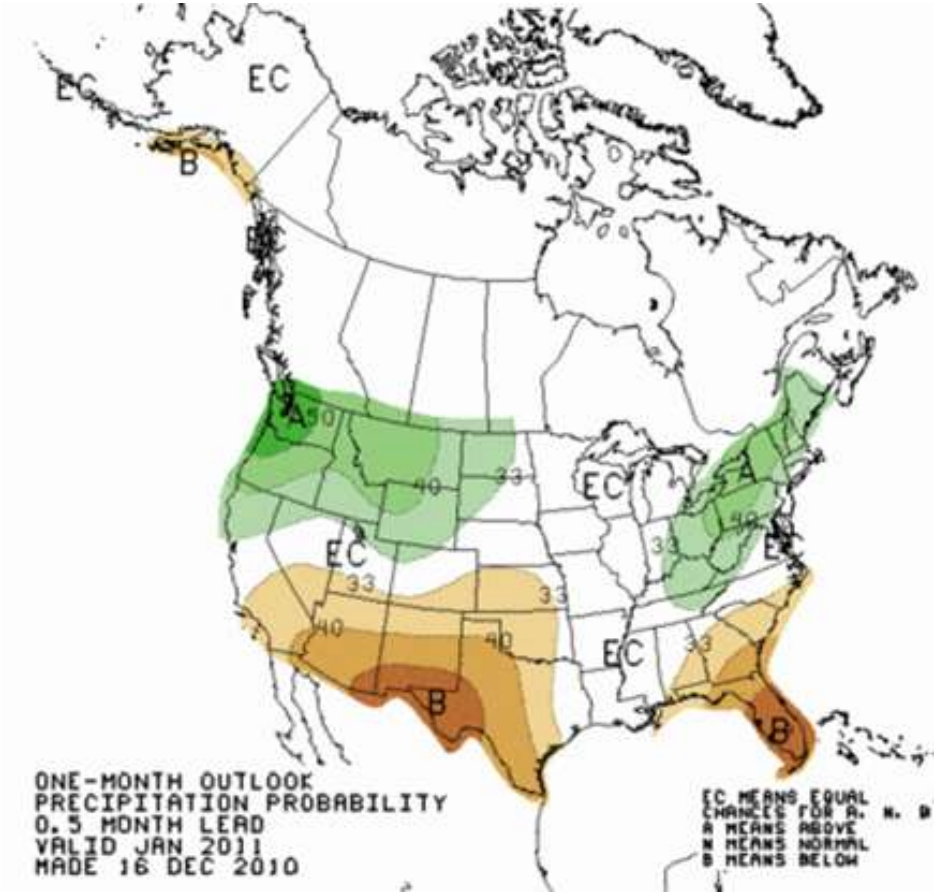
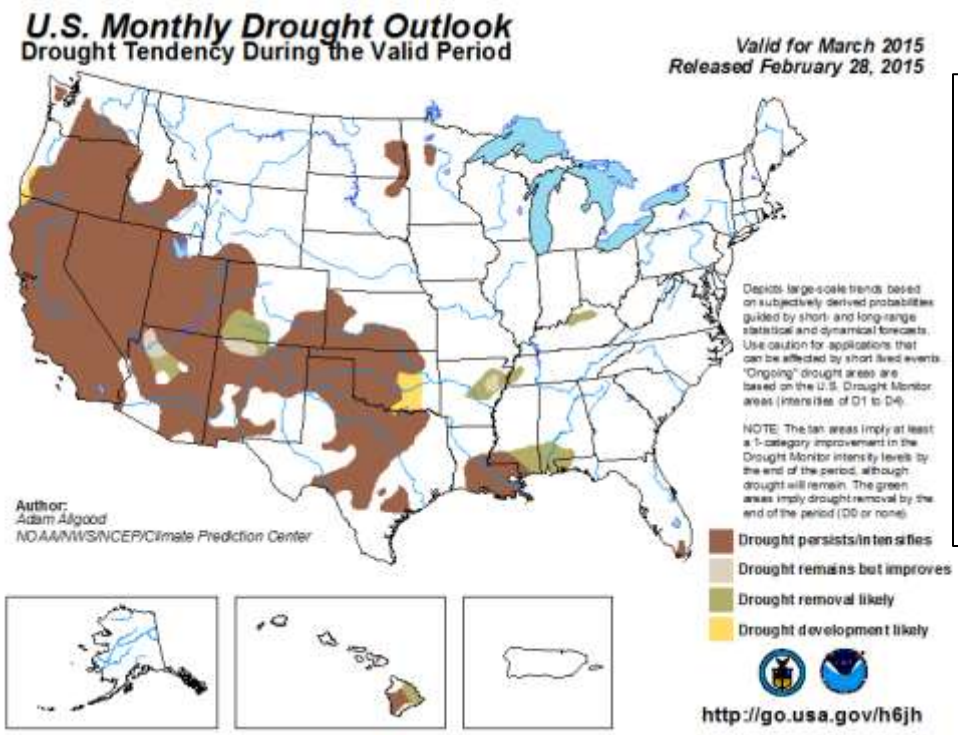
U.S. Monthly Update Temp and Precip Outlooks



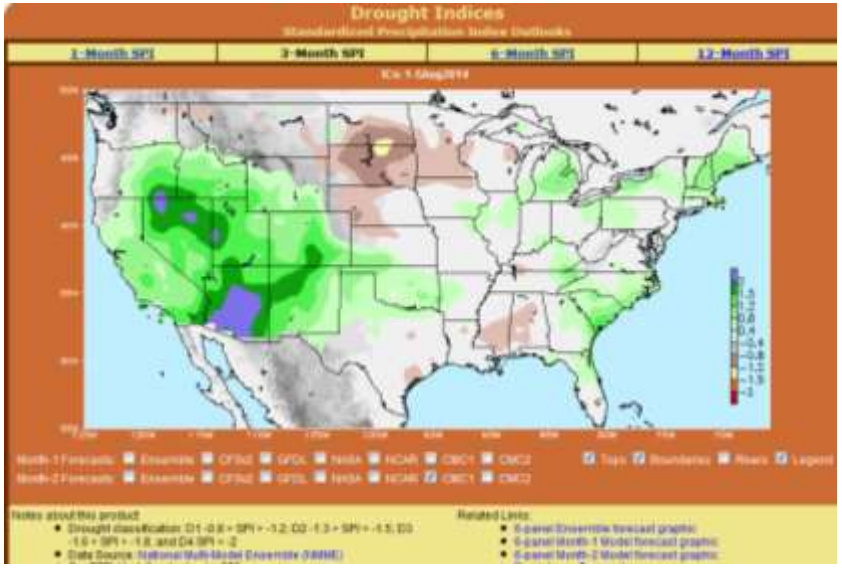


- Released two times per month (seasonal NMME suffices for ½ month lead)
- Update released on the last day of month at 3 PM
- Probabilistic temperature and precipitation
- Subseasonal dynamical model guidance can play an important role

U.S. Monthly Drought Outlook

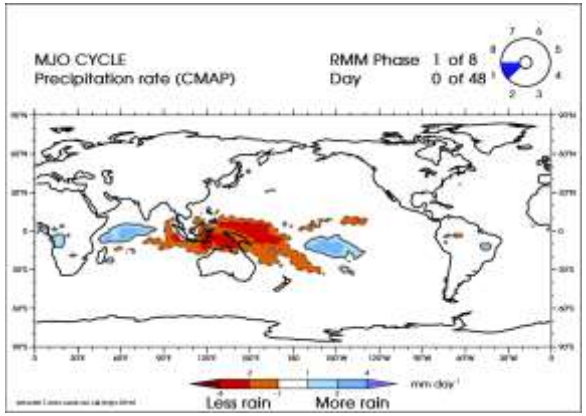


- Released last day of month at 3 PM
- Categorical
- Outlook of drought category tendency
- Utilizes forecast guidance from a range of timescales including subseasonal
- Impact of climatological wet and dry seasons also play a role

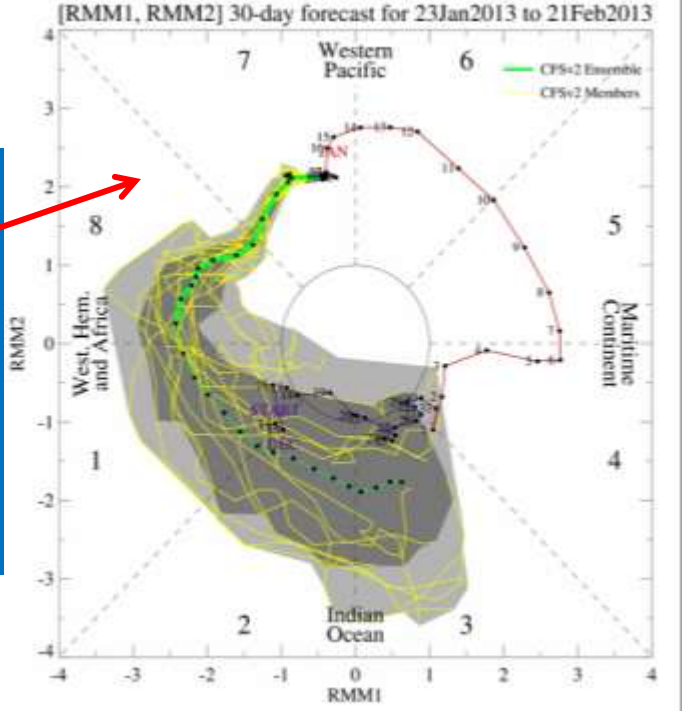


- Monitoring is an important component of the drought outlook preparation
- Subseasonal based drought indices would support outlook

Weekly MJO Assessment



- Yellow Lines: 20 Individual Members,
- Green Line: Ensemble Mean
- RMM1 and RMM2 values for the most recent 40 days and forecasts for the next 30 days
- Light gray shading: 90% of forecasts, dark gray shading: 50% of forecasts



Madden-Julian Oscillation: Recent Evolution, Current Status and Predictions

Update prepared by
Climate Prediction Center / NCEP
December 3, 2007

MJO Weekly Update

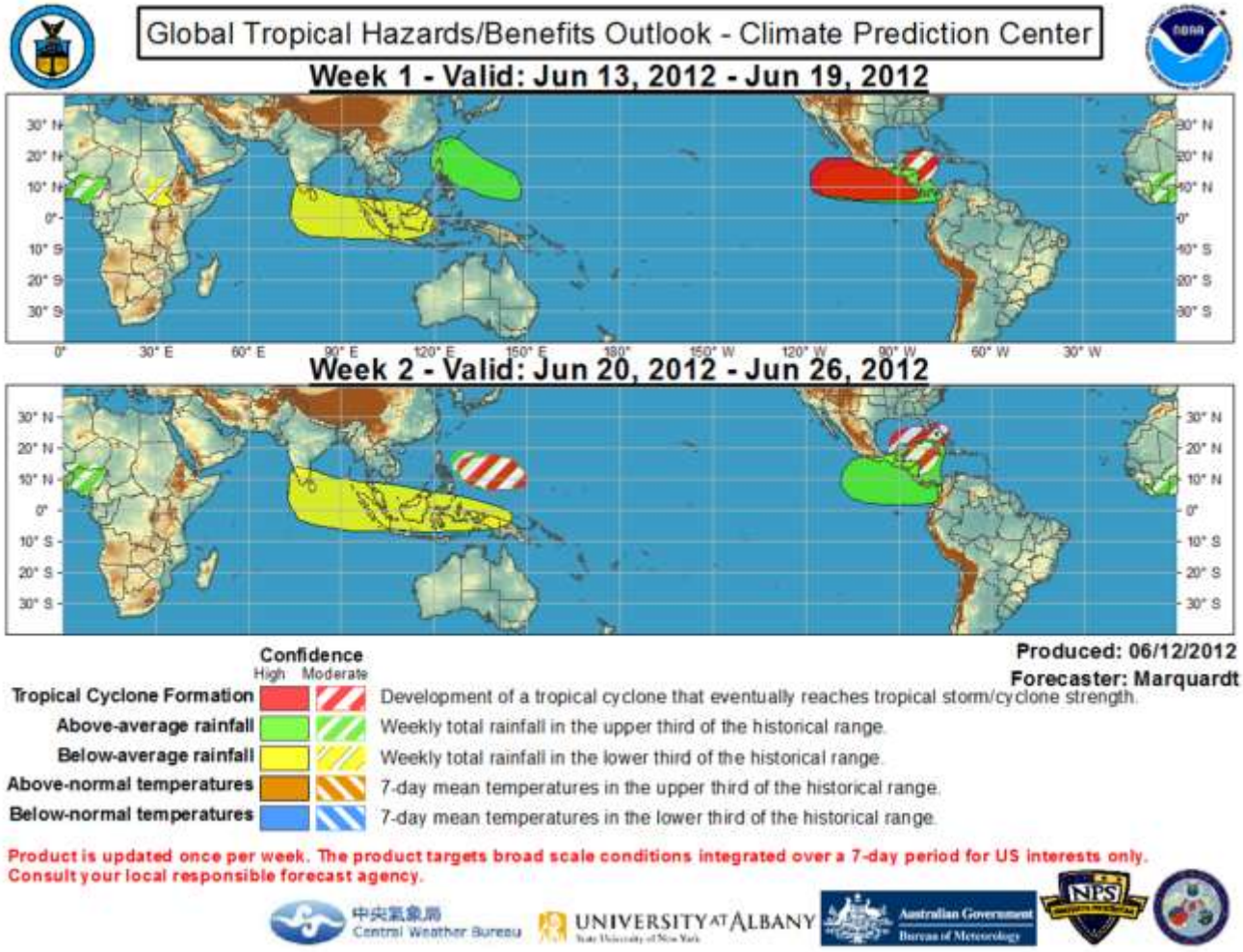
- Released weekly at 4 PM, every Monday
- PDF overview of current MJO status and forecast

MJO Task Force

- Realtime data contributions to CPC from operational international centers
- Some daily, others two times per week
- NMME could contribute as well

http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/clivar_wh.shtml

Hazard Outlooks



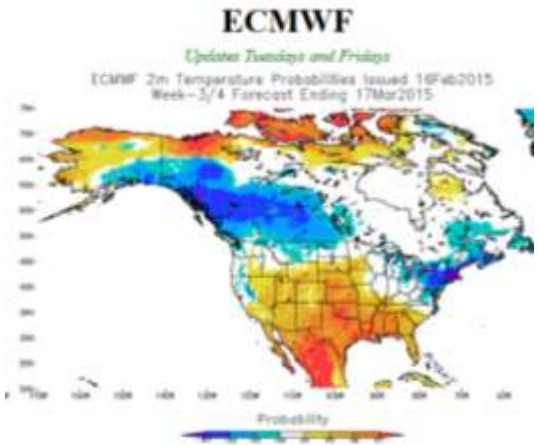
- Released weekly at 2 PM Tuesday
- Identification and prediction of coherent tropical subseasonal variability (MJO but also atmospheric Kelvin waves, equatorial Rossby waves, etc.)
- Dynamical and statistical model guidance
- Subseasonal NMME can contribute as plans are to extend to Week 3-4 in coming years

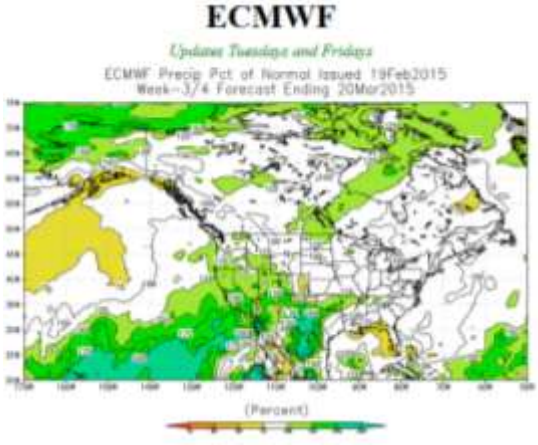
Outline

- CPC Subseasonal Official Outlook Product Suite
- **Planned Experimental Subseasonal Outlook Products**
- NMME needs / requirements

Experimental Week 3-4 T/P Outlooks

- CPC will release experimental Week 3-4 outlooks in FY15 Q4
- The experimental product is to be a combined Week 3-4 probabilistic temperature and precipitation outlook released once per week (exact day and format currently being finalized)
- A team is actively evaluating dynamical model guidance from the CFS, ECMWF and JMA operational data streams.
- A subseasonal NMME would provide additional support to this activity.





Experimental Probabilistic Hazards Outlooks

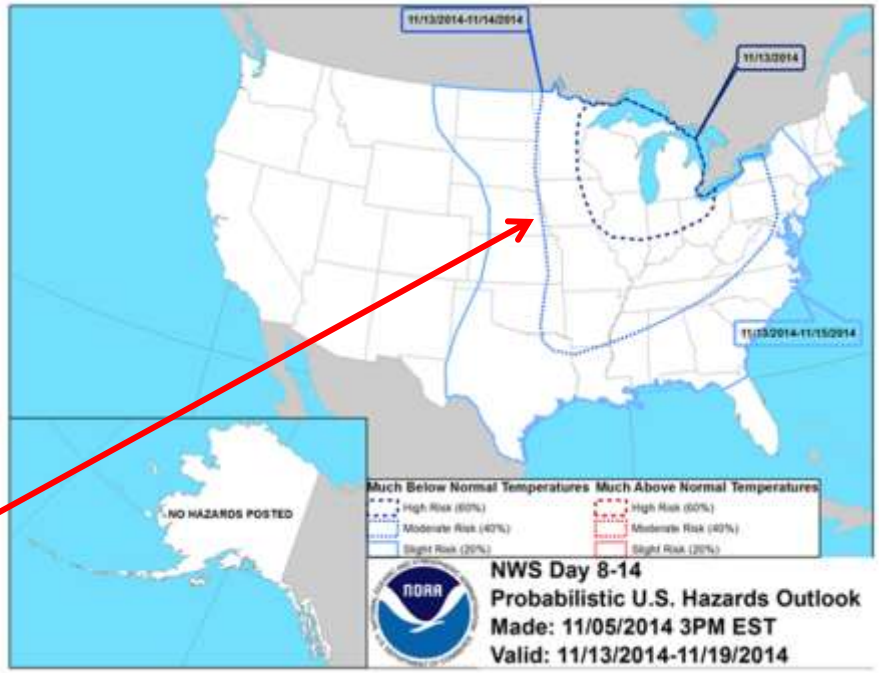
- Emphasis at CPC and within NOAA to push for increased lead time on extremes

- CPC has efforts to adjust our Week-2 product suite to include probabilistic hazard outlooks for temperature, excessive heat, precipitation and wind related variables

- Relevant at this meeting because of research component of NMME and longer term goals and needs for potential extension into Week 3-4

- A subseasonal NMME system could provide potential support to this aim

Provide advance notice for low probability, but potential high impact events



Outline

- CPC Subseasonal Official Outlook Product Suite
- Planned Experimental Subseasonal Outlook Products
- **NMME needs/requirements and issues**

Needs from a Subseasonal NMME system

Frequency, timing, length, variables, etc.

- Produced at least once per week to be complete by COB Wednesday with a forecast length of at least 40 days
  - (1) Monthly update for temperature and precipitation outlook
  - (2) Monthly drought outlook
  - (3) Week 3-4 experimental temperature and precipitation outlooks

- Last Wednesday of month produce monthly forecast products
  - (1) Updated monthly temperature and precipitation outlook
  - (2) Monthly drought outlook

- Variables required include **2 meter temperature, precipitation, 500-hPa and 200-hPa height**, RH, **U850, U200, OLR**, Tmax, Tmin, 10 m wind, soil moisture
  - (1) Monthly update and Week 3-4 temperature and precipitation outlooks
  - (2) Monthly drought outlook
  - (3) Weekly MJO assessment / Global Tropics Hazards / U.S. Extremes

Needs from a Subseasonal NMME system

Model configuration, ensemble members, etc.

- Realtime forecast model configuration (including initialization) same as that which produced the hindcasts. New model implementations require a new set of hindcasts to be utilized operationally.

  1. Inconsistencies in analyses can cause changes in bias characteristics
  2. Near realtime land and ocean initialization required (i.e., within few days)

- Number of ensemble members from realtime forecasts should be at least 15 (preferably more). Hindcast number could be less but prefer equal.

- Hindcast length must span at least 20 years for the 1995-2015 period with a frequency of at twice per week.

Needs from a Subseasonal NMME system

Data, processing, etc.

- Provide total fields for all ensemble members for both the realtime and hindcast data.
- Global, 1x1, daily mean data required.
- Processing at center level should be automated and data pushed to NCEP Central Operations through official dataflow
- Dry run should be conducted before any experimental implementation of new model or configuration

A Potential Way Forward?

- Previous listed suggestions on requirements are focused on meeting the needs of the CPC monthly update and experimental Week 3-4 outlook products

- Test the waters and resolve of a higher frequency activity such as this through a scaled down pilot study

- Build upon RMM reforecast experiment (Pegion and Kirtman) and apply in realtime for a finite length of time (a few months)

- Advantages: Reduced data required (U850, U200 and OLR, 15N-15S averaged), testing with constraints the increase in operational tempo and finally contribute operational MJO assessment activity

Summary

- CPC has several current operational and planned experimental products and services that would benefit from a subseasonal NMME
- In particular, a subseasonal NMME system would further support the Week 3-4 outlook objectives emphasized by NOAA
- Requirements include a system run at least once per week to 40 days, that has a robust initialization and hindcast strategy and provides daily global data
- Pilot realtime study to support weekly MJO assessment (i.e., model RMM forecast plots) and Global Tropics Hazards Outlook may serve as a potential start

Thank you

Comments, Suggestions or Questions?

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